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ABSTRACT

This manual provides curriculum materials for implementing a career exploration class in marine science occupations within a Practical Arts Education program for middle/junior high school students. Introductory materials include the program master sequence, a list of marine science occupations, and an overview of the competency-based instructional system for practical arts. The instructor's guide to learning activities contains guide sheets for each task assignment sheet, which present objectives, attitudes and values to be developed, checkout activities, recommended references and audiovisuals, notes and suggestions for instruction, and references and necessary tools and equipment. Master copies of learning activities are included. Appendixes include a vocabulary listing, a list of practical arts videotapes, a list of references appropriate for career exploration, and ideas for addressing students with special needs. The four student task assignment sheets are also included. Each contains the following components: an introduction, objectives, learning activities, checkout activities, vocabulary, instruction sheets, and a copy of the instructor's final checklist. The tasks provided include the following: reading an oceanography chart, identifying ocean basin features, identifying external features of a bony fish, and investigating fish behavior. (YLB)

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Instructor's Manual

Practical Arts

MARINE SCIENCE EXPLORATION

Competency - Based Education

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1983
Kentucky Department of Education

PRACTICAL ARTS

Marine Science Exploration

Directed by

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Office of Research and Planning

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Bureau of Vocational Education

1983

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iii
PROGRAM MASTER SEQUENCE	iv
MARINE SCIENCE OCCUPATIONS	v
OVERVIEW OF THE CBVE INSTRUCTION SYSTEM FOR PRACTICAL ARTS	vi
Overview of Program	vi
Competency Based Vocational Education	vi
Using the Instructor's Manual	vii
INSTRUCTOR'S GUIDE TO LEARNING ACTIVITIES	1
APPENDIX	21
Vocabulary Listing	23
Practical Arts Videotapes	24
References Appropriate for Career Exploration	26
Addressing Students with Special Needs	27

[Student Task Assignment Sheets]

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PROGRAM MASTER SEQUENCE
PRACTICAL ARTS

Marine Science Exploration

CODE NUMBER		MODULE STOCK NUMBER	SLIDE STOCK NUMBER	TAPE STOCK NUMBER
	OCEANOGRAPHY FAMILY			
PA-MS-1	Read an Oceangraphy Chart	6-227	*	*
PA-MS-2	Identify Ocean Basin Features	6-228	*	*
	LIMNOLOGY FAMILY			
PA-MS-3	Identify External Features of a Bony Fish	6-229	*	*
PA-MS-4	Investigate Fish Behavior	6-230	*	*

MARINE SCIENCE OCCUPATIONS

Oceanography Job Family

Geological Oceanographer
Oceanographer Assistant
Hydrologist
Aquatic Biologist
Marine Technician
Marine Miner
Navigator
Sponge and Seaweed Gatherer
Deepsea Fisherperson
Undersea Warefare Engineer
Ship Captain

Limnology Job Family (Fresh Water)

Fish Farmer
Fish Hatchery Supervisor
Fish Culture Technician
Water Power Engineer
Microbiologist
Geologist
Chemist

OVERVIEW OF THE CBVE INSTRUCTIONAL SYSTEM FOR PRACTICAL ARTS

Overview of Program

The purpose of the Practical Arts Education program is to broaden the experiences of middle/junior high school students by providing them with an opportunity to become oriented to the world of work and explore a diversity of career goals in order that they may be better prepared to make decisions on their personal needs and future goals. The Practical Arts program consists of a series of career exploration classes based on the occupational clusters spread over a two-year period. A cruise through each occupational cluster shall include the implementation of three behavioral components or domains.

(A) Cognitive: Students shall survey or cruise the content of the occupational cluster. This survey should include the scope, levels, working conditions, entry requirements, duties performed, opportunities, and related jobs in the occupational cluster.

(B) Psychomotor: Students shall have in each cluster experiences of tasks that will be the same as or similar to those who work in the occupational cluster. These experiences or tasks shall be action oriented, vary with the students' interests, aptitudes, and abilities, and be at various levels of employment within a cluster.

(C) Affective: Students shall receive guidance and the opportunity to systematically apply those knowledges and experiences within the cluster to his/her own interest and abilities, his/her present and future choices, and future occupational decisions and experiences.

The competency-based vocational education curriculum is specifically directed at the psychomotor, activities, experience, or tasks aspect of the Practical Arts program. Teachers are encouraged to augment their lesson plans with cognitive information about the occupational clusters from other sources. The curriuclum here will help specifically in the psychomotor aspect of the program.

Competency-Based Vocational Education

The purpose of this manual is to aid the instructor in implementing a competency-based instructional program. It is intended as a guide and resource for the teacher using CBVE materials. The materials in any occupational area have several common elements, particularly their purpose and their format, which will be discussed later.

Regardless of the delivery system used to implement it, CBVE is based on the concept of competencies. That is to say, it is an instructional system in which: (1) the competencies for specific occupations are built around tasks validated by incumbent workers; (2) instruction is designed around performance objectives based on the worker tasks; (3) students are held accountable for meeting the specified minimum standards of performance required for entry-level jobs.

These instructional materials have been developed by Kentucky teachers. They have attempted to provide relevant learning activities and performance objectives which include: (1) the skills (or tasks) which the student must learn; (2) the conditions under which the student must perform; and (3) the standard or level of achievement to which the student must perform.

The purpose of the Curriculum Unit (CBVE) is to develop and assist the implementation of competency-based instructional materials. The Unit is located at:

1910 Capital Plaza Tower
Frankfort, KY 40601

To facilitate the implementation of CBVE materials, a person has been identified in each vocational region as a CBVE Contact Person. Please address any problems or concerns about your CBVE program to your Regional Contact Person.

By the time you receive your CBVE materials, you should have attended a workshop for teachers implementing CBVE materials. The Inservice Education modules, which were distributed at the workshop, are your greatest source of suggestions for setting up and managing a CBVE program. For more detailed information, consult your inservice modules or your Regional Contact Person.

Using the Instructor's Manual

This Instructor's Manual is divided into two sections: introductory materials and Instructor's Guide to Learning Activities. The introductory materials include, among other things, the Program Master Sequence. It contains a listing of the task assignment sheet and slide/tape titles, code numbers, and stock numbers.

You can use the Program Master Sequence as a quick reference guide to the contents of the instructional program, as well as a checklist for insuring that all materials have been received. The code numbers and stock numbers serve as a guide to ordering additional materials.

The Instructor's Guide to Learning Activities is the heart of this manual, because it contains a brief listing of the contents of each task assignment sheet with suggestions for its use. It is suggested that you insert the corresponding task assignment sheet behind the Guide Sheets so you will have the complete program in one place.

Format is consistent throughout all CBVE programs in that the materials contain the same basic components:

Introduction - tells the student what he/she will learn and why it is important.

Objective - clearly states what the student is expected to know or do, under what conditions, and how well.

Learning Activities - a "road map" for the student to follow in going through the task assignment sheets; list the various activities the student will perform in learning the task.

Instructor's Final Checklist - tells the student and the instructor exactly what the student will be evaluated on in the check-out activity; the instructor uses this sheet to rate the student's performance.

Check-Out Activities - tells the student what he/she will be asked to do for the final test or performance.

The Instructor's Guide Sheets in this manual present the essential information in capsule form. In addition, they list: the recommended references and audio-visuals; attitudes and values to be developed; notes and suggestions for instruction; alternate activities for students; necessary tools and equipment; and space for teacher's notes.

The task assignment sheets are designed to be left intact. Students should be reminded not to write on any of the pages. In some cases, they will be required to obtain duplicates or sheets like the ones shown. These are often student self-checks. They can be filed in a folder and can be obtained as needed.

The Instructor's Final Checklist is another page that should not be written on. It should remain in the task assignment sheet although you may want to make additional copies of it to place in students' folders.

INSTRUCTOR'S GUIDE TO LEARNING ACTIVITIES

READING AN OCEANOGRAPHY CHART

OBJECTIVE

GIVEN an oceanography chart and a set of questions,

READ THE CHART AND ANSWER THE QUESTIONS.

YOU SHOULD answer the questions with 90% accuracy.

ATTITUDES AND VALUES TO BE DEVELOPED

--The students will realize that many marine science occupations require a knowledge of map reading.

CONTENTS

	Learning Activity Number
Instructor's Final Checklist	
READING AN OCEANOGRAPHY CHART	6

CHECK-OUT ACTIVITY

Your teacher will provide an oceanography chart and a set of questions. Use the chart to answer the questions.

SUGGESTED REFERENCES

"Oceanograpy Chart" (39" X 29," Full Color, $4.50)
Scarfo Productions
1114 Osborne Road
Downingtown, PA 19335

Nautical Charts
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Survey (C-44)
Riverdale, MD 20840

LAB	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1	Display the chart for the class to examine. Call attention to the major parts of the chart. Discuss how a navigator can use the chart.	Oceanography Chart	
2	Divide the class into groups. Have them take turns reading the legend and finding the land areas, the Continental Shelf, and the water areas.	Oceanography Chart	
3	Divide the class into three groups. Have one group locate and list the oceans, the second group the seas, and the third group the lakes in North America. (Another approach to this activity is to assign a small group one continent in which to locate and list oceans and/or seas, bays and lakes.)	Oceanography Chart	
4	Divide the class into small groups. Assign each group one of the following ocean areas to locate on the map: --ridges --trenches --fracture zones --mountains	Oceanography Chart	

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
	Have the students list the proper names of the ridges, trenches, etc. and point them out on the chart for the class.		
5	Explain how to read distances from the equator and from the prime meridian. (You may decide to use a globe to point out the latitude and longitude lines.) Show the class where the prime meridian passes through Greenwich, England. Present locations which appear on the chart, and let the class read the latitude and longitude for each one.	Oceanography Chart Globe (optional) List of locations shown on the chart	
6	Prepare a set of questions, and have the students refer to the chart for the answers. (You may want to prepare several sets of questions and assign each set to a small group of students who may work together.) Use the Instructor's Final Checklist to evaluate each student's performance.	Questions concerning features of the oceanography chart Oceanography Chart Instructor's Final Checklist	

IDENTIFYING OCEAN BASIN FEATURES

OBJECTIVE

GIVEN a chart of ocean basin features,

LABEL EACH FEATURE.

YOU SHOULD label all features correctly.

ATTITUDES AND VALUES TO BE DEVELOPED

--The students will realize the importance of becoming thoroughly familiar with the basics before undertaking a job.

CONTENTS

Instruction Sheet	Learning Activity Number
I OCEAN BASIN FEATURES	1
Instructor's Final Checklist	
IDENTIFYING OCEAN BASIN FEATURES	4

CHECK-OUT ACTIVITY

You will be provided a chart of ocean basin features. Label each feature.

RECOMMENDED REFERENCE

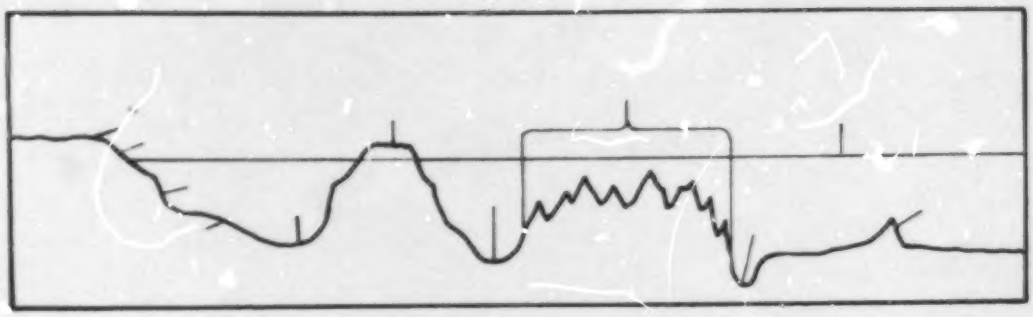
"Oceanography Chart" (39" X 29" Full Color $4.50)
Scarfo Productions
1114 Osborne Road
Downingtown, PA 19335

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1	Have the class study the chart of the ocean basin feature. Discuss each feature. Compare the features such as the trough and the trench.	Instruction Sheet I	
2	Let students locate some of the ocean basin features on the oceanography chart.	Oceanography Chart	
3	Give students a choice of constructing a model of an ocean floor, using the materials listed, or of making a sketch of an ocean floor, coloring each feature and making a color key describing each color.	Instruction Sheet I Supplies for model ocean floor: --Fish tank or pan or large bowl that will hold water --Modeling clay or commercially prepared play dough --Water Supplies for sketch of ocean floor: --Poster board --Pencils --Colored marking pens	
4	Provide each student a copy of the chart, and have him/her label each feature. Use the Answer Key to check the completed charts. Use the Instructor's Final Checklist to evaluate each student's work.	Blank chart of ocean basin features (Master Copy in this section) Answer Key (In this section) Instructor's Final Checklist	

Check-Out Activity

IDENTIFYING OCEAN BASIN FEATURES

Label each of the ocean basin features on the chart below.



IDENTIFYING EXTERNAL FEATURES OF A BONY FISH

OBJECTIVE

GIVEN an illustration of a bony fish,

LABEL THE EXTERNAL FEATURES OF THE FISH.

YOU SHOULD label all of the features correctly.

ATTITUDES AND VALUES TO BE DEVELOPED

--Students will realize that fish are able to live in water because of their physical structure.

CONTENTS

Instruction Sheet	Learning Activity Number
I EXTERNAL FEATURES OF A BONY FISH	1
Instructor's Final Checklist	
IDENTIFYING EXTERNAL FEATURES OF A BONY FISH	4

CHECK-OUT ACTIVITY

You will be provided an illustration of a bony fish. Label each of the external features.

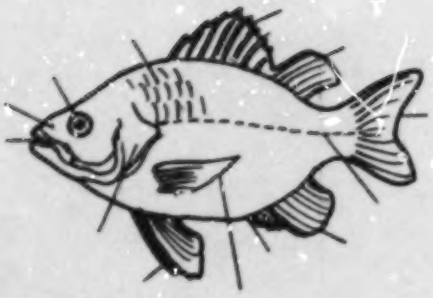
SUGGESTED REFERENCES

--Encyclopedia
--Life Science Textbook

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
1	Have students examine the external features of the fish.	Instruction Sheet I	
2	Have students research one of the external features of the fish and write a report on its physical makeup and function.	Encyclopedia Life Science Textbook	
3	Have each student find a picture of a fish and cut it out or make a sketch of the fish. Let him/her make a poster displaying the picture with the external features labeled.	Encyclopedia Magazines with pictures of fish Poster supplies Markers	
4	Provide each student a copy of the illustration and have him/her label the external features. Refer to Instruction I to check the answers. Use the Instructor's Final Checklist to evaluate each student's work.	"External Features of a Bony Fish" (Master Copy in this section) Instruction Sheet I Instructor's Final Checklist	

Check-Out Activity

EXTERNAL FEATURES OF A BONY FISH



INVESTIGATING FISH BEHAVIOR

OBJECTIVE

GIVEN an aquarium with several species of fish and a Fish Observation Chart,

INVESTIGATE THE BEHAVIOR OF THE SPECIES FOR FIVE DAYS, AND COMPLETE THE FISH OBSERVATION CHART each day.

YOU SHOULD complete all sections of your chart.

ATTITUDES AND VALUES TO BE DEVELOPED

--Students will realize that an organism is directly related to its environment.

CONTENTS

Instructor's Final Checklist	Learning Activity Number
INVESTIGATING FISH BEHAVIOR	4

CHECK-OUT ACTIVITY

You will be provided a Fish Observation Chart. Investigate the behavior of one of the species of fish in your classroom aquarium for five days. Complete your Fish Observation Chart each day.

SUGGESTED REFERENCE

Learning About Aquariums

The Pet Library Ltd.
700 South Fourth St.
Harrison, NJ 07029

Encyclopedia

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
	For this task, you will need an aquarium and different species of fish (several fish of each species). Some suitable species are: --Zebra --Harlequin --Scissor tail --Rosy titra --Tiger barb --Pristella --Brook stickleback --Three-spined stickleback		
1	Have students identify the various species of fish and write a report on one species.	<u>Learning About Aquariums</u> Encyclopedia	
2	Read the procedures for doing the experiment. Let the students choose the species and the experiment fish. (You may decide to let the students prepare the fish for the experiment.) When the experiment has been completed, lead a discussion of the questions listed at the end of the experiment procedures.	"Observing Schooling Behavior in Fish" (Copy in this section) Aquarium Two species of fish (several fish of each species) Two jars with lids Watch, clock, or timer Dip net	
3	Read the procedures for doing the experiment. Divide the class into teams. Have each team do the experiment and answer the questions listed at the end of the experiment procedures.	"Observing the Effect of Temperature on Fish" (Copy in this section) Aquarium Supplies for each team: --One small fish --One baby food jar with lid	

LA#	NOTES AND SUGGESTIONS FOR INSTRUCTION	REFERENCES AND SPECIAL TOOLS AND EQUIPMENT	TEACHER'S NOTES
3		--Two coffee cans --Method for heating water --Timer or watch/clock with second hand --Dip net --Thermometer (Centigrade)	
4	Provide each student a copy of the chart. Have each student observe one species of fish for five days, and record the information on the chart each day. Use the Instructor's Final Checklist to evaluate each student's work.	Fish Observation Chart (Master Copy in this section) Aquarium with several fish of each species Instructor's Final Checklist	

OBSERVING SCHOOLING BEHAVIOR IN FISH

This experiment is designed to show the tendency of a fish to school with its own species.

Supplies needed:

Aquarium; two species of fish (several fish of each species); two jars with screw tops; dip net; timer, watch, or clock.

Procedure:

1. Fill each jar with aquarium water.
2. Place equal numbers of each species of fish in separate jars, one species per jar.
3. Place a jar at each end of the aquarium.
4. Gently place an experiment fish (one of the two species) in the center of the aquarium. Be sure that you do not direct the fish toward one of the jars.
5. Observe the experiment fish over a 10-minute period. Record the length of time the experiment fish spends in:
   --the center area of the aquarium.
   --the vicinity of the jar at the left end of the aquarium.
   --The vicinity of the jar at the right end of the aquarium.
6. Remove the experiment fish. Reverse the position of the jars. Replace the fish, and repeat Step 4.
7. Remove the experiment fish, and replace it with a fish of the other species. Repeat steps 4 and 5.

Discussion:

1. Which species did the experiment fish school with most?
2. In what other ways did the experiment fish react to the fish in the jars?
3. How did the fish in the jars react to the experiment fish?
4. Why do you think fish move in schools?

*Adapted from, "Schooling Behavior in Fish," Miles H. S. Keenleyside, University of Western Ontario.

OBSERVING THE EFFECT OF TEMPERATURE ON FISH

This experiment is designed to show that a fish is more active in warm water. It is an example of how temperature of water can determine survival of life in that environment.

Supplies Needed:

Aquarium, small fish, baby food jar with lid, coffee can, method for heating water, (hot plate will suffice), timer or watch/clock with secondhand, dip net, thermometer (Centigrade)

Procedure:

CAUTION: Use only clean containers free of detergents. Watch the temperature carefully; it should not exceed 35°C.

1. Preparation --
   a. Fill a coffee can half full with tap water.
   b. Fill baby food jar three-quarters full with aquarium water.
   c. Place the fish in the jar and put on the lid.
   d. Place the jar in the coffee can.

2. Experiment --
   a. Place the jar with the fish in coffee can.
   b. Wait one minute, and record the temperature of the water in the can.
   c. Heat the water to 10°C.
   d. Determine the respiratory rate of the fish by counting and recording the number of breathing motions (opening and closing of mouth and gills) for 20 seconds.
   e. Increase the heat to 20°C, and follow the procedures in "d."
   f. Increase the heat to 30°C, and follow the procedures in "d."
   g. Remove the baby food jar and fish. Allow the water to cool. Remove the fish and put it back into the aquarium.

Questions:

1. How did the breathing rate of the fish in the cool water compare with the one in the warm water?

2. Was the fish more active in the cool or warm water?

3. How would adding heat from industrial plants to rivers, lakes, etc. affect the fish?

Adapted from Marine Science Careers, "Oxygen Consumption of Fish," State of New Jersey, Department of Education, Division of Vocational Education.

Check-out Activity

FISH OBSERVATION CHART

Complete the chart each day for five days.

DATE	WHERE FISH STAY MOST OF THE TIME	WHERE FISH FEED	FISH SCHOOL, DO NOT SCHOOL	FISH ARE VERY ACTIVE MODERATELY ACTIVE, NOT ACTIVE

APPENDIX

VOCABULARY LISTING

Aquarium - a pond, bowl, or glass tank in which living fish, water animals, and water plants are kept.

Aquatic - growing or living in water.

Equator - a circle around the middle of the earth, halfway between the North Pole and the South Pole. The United States is north of the equator.

Latitude - distance north or south from the equator.

Limnologist - one who studies fresh water life.

Longitude - distance east or west from the prime meridian.

Meridian - a circle passing around the earth through the North and South Poles.

Navigator - a person who plots the course for a ship; a person who steers a ship.

Oceanography - the study of the ocean, including the waters, depths, beds, animals, and plants.

Prime meridian - the meridian from which longitude is measured both east and west; 0° longtitude. (It passes through Greenwich, England.)

School - a group of fish swimming together.

Species - a group of plants or animals that have the same kinds of characteristics.

PRACTICAL ARTS VIDEOTAPES

These videotapes are available through the Kentucky Department of Education, Office of Research and Planning, Division of Materials and Curriculum, 19th Floor, Capital Plaza Tower, Frankfort, Kentucky 40601; Telephone: (502) 564-2000.

Agribusiness, Natural Resources and Environmental Occupations

"Coal: Kentucky's Ace in the Hole": 1/2-inch color cartridge; 23 minutes; some on 1/2-inch reel-to-reel; 2 copies on 3/4-inch cassette. Describes types of occupations available in the coal industry and discusses useful coal by-products.

"Wildlife": 3/4-inch color cassette; 25 minutes. Explains the role of wildlife in conservation.

"Energy Careers": 1/2-inch color cartridge; 15 minutes; some on 1/2-inch reel-to-reel; 2 copies on 3/4-inch cassette. Explores careers in the alternative energy areas of solar energy, wind, and coal liquification.

"Agribusiness": 3/4-inch color cassette; 18 minutes. Deals with careers in agriculture and other farm-related careers.

Business and Office Occupations

"The Secretary": 3/4-inch cassette; 18 minutes. Identifies various careers available in the secretarial field.

Communications and Media Occupations

"One Moment, Please": 1/2-inch color cartridge (2 cartridges available); 18 minutes. Explores occupations, ranging from camera operator to producer, available in radio and television production and necessary qualifications.

"Number, Please": 3/4-inch color cassette; 18 minutes. Discusses careers available in the telephone industry and shows on-the-job interviews for jobs in the industry.

"Roll the Presses": 3/4-inch cassette; 19 minutes, 20 seconds. Gives overview of careers needed to produce a newspaper.

Construction Occupations

"Construction Careers": 1/2-inch color cartridge; 20 minutes; some on 1/2-inch reel-to-reel; 2 copies on 3/4-inch cassette. Explores types of occupations, including carpenters, electricians, and plumbers, in construction careers and necessary skills needed for these careers.

Home Economics Occupations

"Gainful Home Economics": 3/4-inch color cassette; 20 minutes, 45 seconds. Describes occupations related to home economics in which people are gainfully employed.

Health Occupations

"RX Good Health": 1/2-inch color cartridge; 23 minutes; 2 copies on 3/4-inch color cassette. Explores health careers, such as medical secretary, laboratory technician, and physical therapist, in addition to doctor and nurse.

Hospitality and Recreation Occupations

"Hospitality Unlimited": 1/2-inch cartridge tape; 16 minutes; color; also on 1/2-inch reel-to-reel; 2 copies on 3/4-inch cassette. Indentifies careers in the restaurant industry and hotel/motel management.

Manufacturing Occupations

"Down the Assembly Line": 3/4-inch cassette; 18 minutes. Depicts production line workers on the job; introduces students to the division of labor system whereby each worker becomes skilled in a single operation.

Orientation to the World of Work

"The Rest of Your Life": 2/4-inch cassette; 30 minutes. Introduces students to step-by-step procedures necessary in seeking employment.

Personal Service Occupations

"Barbering and Cosmetology": 3/4-inch cassette. Explores careers available in these two areas.

Public Service Occupations

"Dear John Mail": 1/2-inch color cartridge; 20 minutes; 2 copies on 3/4-inch color cassette. Explores the types of postal careers and available postal facilities.

"Law Enforcement": 3/4-inch color cassette; 25 minutes. Presents occupations available in law enforcement careers, ranging from policeman to radio operator, and their functions; also identifies necessary qualifications for entering the occupations.

"The Military": 3/4-inch cassette; 17 minutes, 30 seconds. Gives students an overview of various careers associated with the military.

Transportation Occupations

"Tracking A Trucker": 1/2-inch cartridge tape; 22 minutes; color; some on 1/2-inch reel-to-reel; 2 copies on 3/4-inch cassette. Explores occupations needed to support the trucking industry from mechanic to driver.

"The People of the Airlines": 3/4-inch cassette; 22 minutes. Shows people on the job at the airport and on the airplane.

REFERENCES APPROPRIATE FOR CAREER EXPLORATION

Documents

Exploring Careers, 1979
Bulletin 2001
Bureau of Labor Statistics
1371 Peachtree Street, N.E.
Atlanta, GA 30309
Telephone: (404) 881-4418

Occupational Outlook Handbook
Bulletin 1955
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
(Cloth Cover) Stock No. 029-001-02067-8
(Paper Cover) Stock No. 029-001-02059-7

Dictionary of Occupational Titles
Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
Stock No. 029-013-00079-9

Sources of Information

Practical Arts Unit
Bureau of Vocational Education
21st Floor
Capital Plaza Tower
Frankfort, KY 40601
Telephone: (502) 564-3472

Gregg/McGraw-Hill
Webster Division
1221 Avenue of the Americas
New York, NY 10020

McKnight Publishing Company
Bloomington, IL 61701

New Jersey Vocational Technical
Curriculum Laboratory
Rutgers University
4103 Kilmer Campus
New Brunswick, NJ 08903

Ohio Department of Education
Division of Vocational Education
Career Development Service
Columbus, OH 43215

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

Xerox Educational Publications
P.O. Box 16629
Columbus, OH 43216

ADDRESSING STUDENTS WITH SPECIAL NEEDS

Some students may need special help in achieving competencies. Ideas are presented here for helping identify those students and modifying materials and techniques to help them succeed.

Identifying Students with Special Needs

Generally speaking, those students who cannot succeed in the regular vocational education programs without special help are termed "students with special needs" (Vocational Education Act of 1963 and Amendments). Persons most likely to be identified as students with special needs are the academically and economically disadvantaged and the handicapped--the mentally retarded, deaf and hard of hearing, speech impaired, emotionally disturbed, orthopedically (physically) impaired, health impaired, and learning disabled.

The handicapped are further identified as those (1) with a physical or mental disability that substantially impairs one or more major life activities--walking, seeing, hearing, speaking, working, or learning; (2) who have a record or history of such impairment or condition; and (3) who are regarded as having an impairment (Rehabilitation Act of 1973). Women, minorities, the limited English speaking, and others likely to be underemployed or striving for equal opportunity in employment when meeting the criteria for academic or economic deprivation, are specifically identified in the disadvantaged group to be given special help.

Formulating a Basic Approach to Teaching

Society recognizes the right of every individual to an appropriate education, and the law mandates giving persons with special needs an equal chance. In brief:

1. The Vocational Education Amendments of 1976 give special emphasis to developing and providing programs of vocational education for "those with special educational handicaps" and reserves moneys to do so.

2. The Education for All Handicapped Children Act of 1975 assures that all handicapped children between the ages of three to twenty-one have available to them a free, appropriate public education which relates to their unique needs and is provided in the least restrictive environment.

3. The Rehabilitation Act of 1973 prohibits discrimination on the basis of handicap in any program or activity receiving federal financial assistance and directs employers to take affirmative action in hiring handicapped people.

4. The Education Amendments of 1972 prohibit discrimination on the basis of sex in educational programs receiving or benefiting from federal financial assistance.

5. The Civil Rights Act of 1964 prohibits discrimination in employment on the basis of sex, race, color, religion, or national origin in any program or activity receiving federal financial assistance--including training for employment.

We must, then, provide equal opportunity to learn in our instructional processes.

Basically, an approach to teaching which recognizes individual differences in all students provides the best atmosphere for disadvantaged and handicapped students. This approach allows students to work at different rates; involves large group, small group, and individual instruction; incorporates a variety of instructional materials, media, and teaching techniques; and involves a variety of learning activities--reading, doing, discussing, listening, viewing, experiencing, sharing, cooperating, relating, using the senses, etc. It gives disadvantaged and handicapped students the dignity of exploring, learning, and facing the same experiences and responsibilities as other students, without limiting their possibilities by stereotyped concepts of what they can or cannot do.

It involves being organized, with students completely familiar with the teaching/learning plan. When beginning a CBVE class, for example, explain what learning to attain competencies means, how the students will carry out their work, how to use the modules, where to find materials, how and when tests will be given, how "passing" or achieving competency is determined, and what your role as a teacher is.

It also means teacher direction for those students who are not self-directed learners--those with poor academic backgrounds who thrive on teacher interaction and need immediate feedback, instruction simplified, procedures modified, social development as well as specific job skills, role models, or other special aid. For these students, the learning activities described in the modules may become the teacher's lesson plan and be utilized in large-group and small-group settings before the individual student attempts doing learning activities alone. The teacher-directed class might proceed as follows: teacher introduction to tasks to be performed by module or cluster of modules, explanation of what is to be learned and why, presentation of information in small chunks, demonstrations, student tryout and practice, time for questions and answers, trial test followed by reteaching, and evaluation. The teacher will employ a variety of strategies to address the learning needs and styles of the student.

Using Special Strategies

In order to determine the most appropriate teaching strategies, assess the students for kinds of special help required, and develop a plan for meeting any unique needs. Refer to Mainstreaming Guidebook for Vocational Educators by Dahl, Appleby, and Lipe (Olympus Publishing Company, Salt Lake City, Utah 84105), for modifications and general classroom strategies for meeting the unique needs of the different handicapped populations.

Also, enlist the advice and help of employers, support personnel, and agencies and organizations serving disadvantaged and handicapped populations in your school system and geographic area.

Redirecting Teaching Strategies Usually Used

Many of the strategies usually used with regular students may be redirected or modified and also provide effective learning activities for students with special needs. An explanation of how this many be done follows.

AUDIO-VISUALS (films, filmstrips, slide/tape presentations, videotapes, and ETV and commercial television programs). The combination of sight and sound provides more effective communication than either sight or sound alone. Audio-visuals may be used to supplement or replace other methods of presenting information. The hearing impaired will require captioning, signing, or a printed script written at the appropriate reading level or presenting only essential details. The visually impaired may glean information from the sound source, but additional explanation will need to be provided for any visual display of information which is not explained adequately by the narration. Some audio-visual presentations, particularly 8 mm and 16 mm films, may move too fast for the information to be grasped and need to be evaluated with this in mind.

CONTACT WITH WORK ENVIRONMENT. Handicapping conditions, limited finances, geographic isolation, cultural difference, limited communication skills, and social isolation have caused disadvantaged and handicapped persons to have little contact with the world of work. Familiarity with the work setting in which a particular job takes place, relationships with other workers, business use of the telephone, relationship of one's job to other jobs in the same business are just a few examples of areas where special students may require special exposure by means of field trips, spending a day on the job, viewing films, or having additional training sessions.

Note: For those with physical impairments, field trips, on-site job observations, and work experience opportunities will be limited to "accessible" businesses in the community. Before deciding where to go, determine whether the facilities are accessible.

DEMONSTRATION AND TRYOUT. Demonstration by the teacher, experienced workers, and previously-trained students provide reliable role models for learners. Steps, procedures, precautions, physical manipulation, and techniques are imprinted visually in the order and at the time they should occur in task performance. Immediate tryout of the task following the demonstration or an immediate attempt of each step, technique, or procedure as it is demonstrated provides students direct involvement, permits correction and clarification, and promotes retention. Tryout also identifies areas in performance steps, techniques, tools, and work environment where handicapped students need to have modification in order to perform tasks and meet industry standards.

ELIMINATION OF STEREOTYPING. Disadvantaged and handicapped people face more than the sex role stereotyping myths in their quest for employment. The following are just a few examples: "Deaf people are dumb." "The best job for blind people is tuning pianos." "He'll never be able to do that; he's a cripple." "Mr. _____ was no good; neither is his son." "She can

never do that; her parents didn't go to college." In addition to overcoming the unfounded assumptions of others, disadvantaged and handicapped persons often have equal misconceptions about themselves thinking: "I can never do that." "_____, who is deaf, does assembly line work; that's what I'll do, too." "I'll never be anybody."

Overcoming stereotyping may begin with using sex fair instructional materials and media, exploring interests and abilities, exploring two or three nontraditional jobs, or complimenting accomplishments. It may include planning how to reach an educational goal, providing role models (a person with a like handicap or socioeconomic background who has succeeded), as well as observing persons in nontraditional work roles. It means doing whatever raises aspirations and increases self-worth. It means attempting to eliminate underemployment.

EMPLOYER INVOLVEMENT. Programs with employer input are more practical and in line with the current needs of the job market. Employers who make input feel a special kinship to the program and get a chance to see the students before meeting them in the job market.

For disadvantaged and handicapped students, employer involvement offers a very special opportunity to remove common misconceptions about their capabilities. It enables employers to help with any modification needed, see students performing tasks, and observe how the students relate to others. It gives students a chance to prove that they can do the work, that they will not endanger themselves or others, and that they will not increase expenses. These are major employer concerns. Both students and teachers should be prepared to provide reassuring answers and evidence to show there is no more risk than with the nonhandicapped.

Employers may be involved by giving class presentations; giving suggestions for program improvement and modifications; conducting mock interviews; and providing work experience, observations, worker interviews, job analysis, etc.

HANDS-ON EXPERIENCES, PROBLEM SOLVING, PERSONAL INVOLVEMENT (work samples, tryout exercises, games, role playing). Being involved in a sample of work through completing a product, performing related paper work, or role playing interpersonal relationships on the job keeps students interested, holds attention to the learning tasks, and injects the realities of working and job performance in the teaching/learning situation. It makes the student feel that the instruction is practical and valuable. Accomplishment means "qualified for work"--a great boost to self-esteem for those who doubt self-worth.

The instructor and other students should avoid taking over when handicapped students are awkward or slow in completing a task. The student cannot master the skill if someone else does it.

ILLUSTRATIONS (pictures, graphs, bulletin boards, transparencies, and other visuals). The disadvantaged, the mentally retarded, and the hearing impaired, particularly, are especially oriented to visual methods of learning. Other students, with the exception of the blind and some visually impaired, will appreciate visual presentation of information to

be learned. Student handouts, with the steps to a task illustrated and briefly and simply explained, are especially helpful. Captioning and brief explanations are important supplements. Many illustrations may be adapted for the visually impaired by making them tactile (so that they can be felt). Sometimes enlarged print and bold outlines help.

INTERACTION; INDEPENDENCE. Economic deprivation, geographic isolation, cultural isolation, and restrictions on mobility and social relationships imposed by physical impairments have limited the experiences of the disadvantaged and the handicapped in the community at large. Many have no previous work experience, little observation of the worker's daily routine, and limited social experiences. They have been sheltered at home, absent from the scene, and at best, onlookers.

So that they will not continue in this role after vocational training, experiences in the community and involvement with nonhandicapped people and other students are of utmost importance. These students, as well as their families and the working community, need proof that they can function independently and competently. They need to establish contacts who can serve as references to recommend them as competent workers who can relate to others.

Field trips, worker interviews, cooperative work experience, spending a day on the job, giving talks before civic groups are, therefore, important to the acclimation of disadvantaged and handicapped students to the world of work. Participating in team work projects with other students; pairing with a slower or faster learning peer; pairing with a nonhandicapped, a nondisadvantaged, or person from another race or culture will help achieve faster comprehension and understanding and promote learning communication skills. Teaching special units dealing with related communication and social skills will also be necessary; for example: office etiquette, relationships with employer and other employees, daily work expectations which are not direct task performance, telephone skills, appropriate dress and grooming habits, to name a few.

LISTENING (explaining, discussing, reacting orally). Learning by listening is an important tool to the disadvantaged, the visually impaired, the speech impaired, the learning disabled, and others who "prefer to be told" or "have to be told" rather than read about it.

The visually impaired require identification of familiar sounds in the work place to determine location of different work areas, equipment functions, and hazards. The hearing impaired require sight substitutions, such as indicator lights, for critical sounds they cannot hear. They may use lip reading, interpreting, and sound conduction or amplification devices. The retarded need to become accustomed to the sounds of the work place so that they can work without being distracted. The speech impaired need to be given the right to listen although they may have trouble participating, or may not be able to participate orally.

When information is presented for listening, instruction in how to listen (what to listen for) is important. An outline of the information presented, supplemented by visuals, tryout exercises, showing, completion

of a guidesheet questions to be answered, analysis of cases or problem situations, or other application activities will enhance use and retention of information heard.

Listening is a vocational skill as well as a learning skill. Workers must be able to receive information by listening as well as provide information for listening. Most on-the-job instruction is given orally. Explanation must be given to and received from customers, co-workers, and supervisors.

READING HELPS. Being fluent in the technical vocabulary or language of the job and able to read at the level required by the job is a part of occupational competency. On-the-job reading requirements may vary from the reading of signs to following instructions given in technical manuals. The instruction given in reading, then, for vocational purposes, will depend on the reading skills possessed by the student and the reading requirements of the job. Whether or not a supplemental class in remedial reading is offered, the vocational instructor will find that providing reading aids also helps provide job skill.

Braille materials, large print textbooks, magnifying devices, and recordings may be provided for the visually impaired. Materials may be simplified or outlined for the hearing impaired and others with limited language skills. The native language may be supplied above the English for critical information in textbooks used by the limited English-speaking. Familiarity with the setting in which the printed information is applied may be given via field trips, demonstrations, or films to make reading easier and more meaningful.

Students with exceptional reading problems may require the help of a special reading teacher or be enrolled in a remedial reading program. Some schools employ vocational reading teachers to assist vocational students with developing vocational reading skills and doing the reading required in their programs.

RECORDING AND RECORDINGS (tapes, records, radio programs). Information may be presented and gained by listening to recorded information rather than reading. This strategy will aid the nonreader, the poor reader, the visually impaired, the learning disabled, and others through use as a variation of teaching technique. Recording is also a useful tool for the deaf in notetaking; the recording script may be transcribed into print later by a hearing individual. It will also provide instruction for those who have missed initial classroom presentation of information or who need review. Recordings may be supplemented by slides and pictures.

RELATED MATH. Competency in math, like competency in reading, is more critical to some jobs than to others. Math is best taught in relation to the task of which it is a part. This instruction should incorporate basic math and remedial math instruction as needed. A cooperative or team teaching effort with the math teachers or related math instructors in the school will relieve the burden on the vocational instructor. Enough practice and application exercises should be provided to insure retention of the math operations involved. It is helpful to compile a list of the

math competencies needed to complete the training program, prepare an assessment test to determine student skills, and plan in the beginning a program which the student can follow to attain the basic math competencies prerequisite to the course. If the skills cannot be acquired simultaneously to the job skill training program, the student should postpone entry into the course until the prerequisite skills are attained. It may be necessary to prepare a special manual and modules to provide the related math instruction.

REMEDIAL AND RETENTION EXERCISES. Doing learning activities does not necessarily make students occupationally competent. Performance must be observed, misunderstandings clarified, procedures and techniques corrected, and repetition called for at a future time. Lesson planning should anticipate theory and tasks with which students are likely to have difficulty, include additional practice exercises, and provide alternate approaches to teaching. Repetition for retention should be provided, such as repetition of information in different media presentations or use of different types of application exercises. Review sessions, keeping notebooks, completing work samples, doing live work, and solving cases will also help.

SAFETY. The Occupational Health and Safety Act has increased employer concern for safety and underscored the importance of providing safety instruction along with task performance. It is especially important for the handicapped in two ways: (1) to overcome employer concern about the handicapped person's ability to take care of himself/herself and not endanger the lives of others; (2) to identify and deal with situations which are hazardous for persons because of particular handicaps.

To meet these needs for safety instruction, the handicapped student not only needs the basic or general safety instruction related to the occupation but safety instruction or special safety provisions needed for a person with his/her particular handicap. An example is the installation of a blinking light to tell a person who is deaf that the equipment is running.

Note: The Kentucky Department of Labor, Occupational Safety and Health Program, Division of Education and Training, Frankfort, Kentucky 40601, Phone: (502) 564-6895, offers training programs to help vocational instructors teach safety.

SUPPORT SERVICES. Some students will require emotional, social, and financial support in order to succeed in the instructional programs. Others will need career counseling and special assistance in becoming employed. Government agencies, special schools, special personnel, and organizations for disadvantaged and handicapped persons can provide this help. The following are examples and should not be considered an all-inclusive list: resource room teachers, rehabilitation counselors, guidance counselors, tutors, remedial teachers, instructors in special schools, occupational therapists, diagnostic specialists, media personnel, handicapped workers, workers who are members of a minority group, social workers, and others who can serve as role models. Survey the community to identify persons who serve the needs of disadvantaged and handicapped persons in your area and incorporate their assistance in related learning activities.

UNIQUE MODIFICATIONS (modified equipment, tools, learning aids, changes in work environment, adaptations in course or training program content). Some students require special help in meeting physical job requirements. When considering modification, it is important to concentrate on what the student can do. If at all possible, enable the student to function in the work environment as it is usually found. Employers look favorably on handicapped persons with this kind of preparation.

Rehabilitation centers; organizations and schools for the blind, deaf, dyslectic, disabled, and the mentally handicapped; and publishers and manufacturers of special instructional materials, aids, and equipment can offer aid in meeting unique needs. Consultation with special education personnel and rehabilitation counselors is a good starting point. The student should also be asked to make suggestions.

Care should be taken to insure occupational competency. Prospective employers should be shown how the modification operates in the work setting and how it increases efficiency.

The previously described list of strategies is not exhaustive. Others may be added. All will need to be directed toward the occupation for which training is being given, the students enrolled, the availability of instructional materials, and the community. It is also important to remember that what works well for one group of students or a particular student will not necessarily work well for another.

PRACTICAL ARTS

MARINE SCIENCE EXPLORATION

Task Assignment Sheets PA-MS 1-4

Practical Arts

MARINE SCIENCE EXPLORATION

TASK: READING AN OCEANOGRAPHY CHART

INTRODUCTION

A little over 70 percent of the earth's surface is under water. The oceans, seas, lakes, and rivers are a source of many jobs. Many workers in marine science occupations must refer to oceanography charts. In this task assignment sheet, you will learn how to read an oceanography chart.

OBJECTIVE

GIVEN an oceanography chart and a set of questions,

READ THE CHART AND ANSWER THE QUESTIONS.

YOU SHOULD answer the questions with 90% accuracy.

LEARNING ACTIVITIES

1. EXAMINE an oceanography chart. IDENTIFY the major parts. DISCUSS how a navigator can use the chart.
2. READ the legend and FIND the land areas, the Continental Shelf, and the water areas.
3. LIST the oceans and seas. Also LIST lakes in North America.
4. FIND and LIST ocean ridges, trenches, fracture zones, or mountains.
5. WATCH and LISTEN as your teacher explains how to read the latitude and longitude. PRACTICE finding distances from the equator and from the prime meridian.
6. ARRANGE with your teacher to complete this task by going through the CHECK-OUT ACTIVITY.

CHECK-OUT ACTIVITY

Your teacher will provide an oceanography chart and a set of questions. Use the chart to answer the questions.

VOCABULARY

Equator - a circle around the middle of the earth, halfway between the North Pole and the South Pole. The United States is north of the equator.

Latitude - distance north or south from the equator.

Longitude - distance east or west from the prime meridian.

Meridian - a circle passing around the earth through the North and South Poles.

Navigator - a person who plots the course for a ship; a person who steers a ship.

Oceanography - the study of the ocean, including the waters, depths, beds, animals, and plants.

Prime meridian - the meridian from which longitude is measured both east and west; 0° longtitude. (It passes through Greenwich , England.)

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INSTRUCTOR'S FINAL CHECKLIST

READING AN OCEANOGRAPHY CHART

Accomplished	Not Accomplished

Performance Level: All items must receive a rating of ACCOMPLISHED. If any items are rated NOT ACCOMPLISHED, the student and the instructor will decide if any learning activities must be repeated.

The student read the oceanography chart and answered the questions with 90% accuracy..... [ ] [ ]

Practical Arts

MARINE SCIENCE EXPLORATION

TASK: IDENTIFYING OCEAN BASIN FEATURES

INTRODUCTION

Geological oceanographers study the bottom of the ocean. In order for them to carry out their various studies, they must be familiar with the structure of the ocean floor. In this task assignment sheet, you will learn to identify ocean basin features.

OBJECTIVE

GIVEN a chart of ocean basin features,

LABEL EACH FEATURE.

YOU SHOULD label all features correctly.

LEARNING ACTIVITIES

1. LOOK AT and DISCUSS the ocean basin chart in Instruction Sheet 1, OCEAN BASIN FEATURES.

2. LOCATE some of the features on an oceanography chart.

3. BUILD a model of an ocean floor. Your teacher will tell you more about this activity. EXHIBIT your model,

   OR

   SKETCH an ocean floor, and COLOR each feature a different color. MAKE a color key describing each color. DISPLAY your sketch.

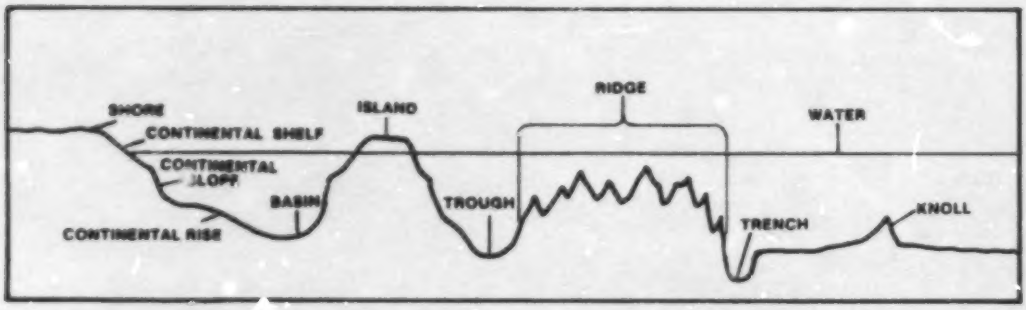
4. ARRANGE with your teacher to complete this module by going through the CHECK-OUT ACTIVITY.

CHECK-OUT ACTIVITY

You will be provided a chart of ocean basin features. Label each feature.

INSTRUCTION SHEET I

OCEAN BASIN FEATURES



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INSTRUCTOR'S FINAL CHECKLIST

IDENTIFYING OCEAN BASIN FEATURES

	Accomplished	Not Accomplished
Performance Level: All items must receive a rating of ACCOMPLISHED. If any items are rated NOT ACCOMPLISHED, the student and the instructor will decide if any learning activities must be repeated.		
In identifying ocean basin features, the student labeled all the features correctly.....	[ ]	[ ]

Practical Arts

MARINE SCIENCE EXPLORATION

TASK: IDENTIFYING EXTERNAL FEATURES OF A BONY FISH

INTRODUCTION

Limnologists study fresh water aquatic life, which grows or lives in water. In order to understand how aquatic animals function, they must be thoroughly familiar with their physical structure. In this task assignment sheet, you will learn about the external features of a bony fish.

OBJECTIVE

GIVEN an illustration of a bony fish,

LABEL THE EXTERNAL FEATURES OF THE FISH.

YOU SHOULD label all of the features correctly.

LEARNING ACTIVITIES

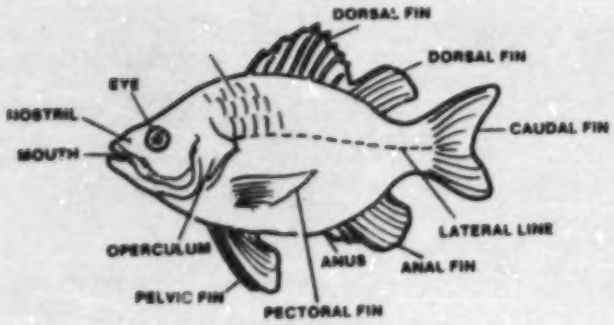
1. EXAMINE the external features of the fish in Instruction Sheet I, EXTERNAL FEATURES OF A BONY FISH.
2. RESEARCH one of the external features of the bony fish. WRITE a report on the physical makeup and the function of the feature. READ your report in class.
3. FIND a picture of a fish. CUT OUT the picture or MAKE sketches of the fish. PREPARE a poster displaying the picture, and LABEL each of the external features.
4. ARRANGE with your teacher to complete this task by going through the CHECK-OUT ACTIVITY.

CHECK-OUT ACTIVITY

You will be provided an illustration of a bony fish. Label each of the external features.

Instruction Sheet I

EXTERNAL FEATURES OF A BONY FISH



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Instructor's Final Checklist

IDENTIFYING EXTERNAL FEATURES OF A BONY FISH

Accomplished	Not Accomplished

Performance Level: All items must receive a rating of ACCOMPLISHED. If any items are rated NOT ACCOMPLISHED, the student and the instructor will decide if any learning activities must be repeated.

The student labeled all of the external features of the fish correctly	[ ]	[ ]

Practical Arts

MARINE SCIENCE EXPLORATION

TASK: INVESTIGATING FISH BEHAVIOR

INTRODUCTION

Aquatic biologists study plants and animals living in water. They often investigate the salt content, oxygen content, and temperature of the water in order to determine the effects on fish and plant life. They also study the behavior of fish in certain environments. In this task assignment sheet, you will investigate the behavior of fish living in an aquarium.

OBJECTIVE

GIVEN an aquarium with several species of fish and a Fish Observation Chart,

INVESTIGATE THE BEHAVIOR OF ONE SPECIES FOR FIVE DAYS, AND COMPLETE THE FISH OBSERVATION CHART each day.

YOU SHOULD complete all sections of your chart.

LEARNING ACTIVITIES

1. IDENTIFY the various species of fish in your classroom aquarium. Your teacher will provide a reference. WRITE a report on one of the species.

2. PARTICIPATE in an experiment on the schooling behavior in fish. ANSWER questions on the results of the experiment. Your teacher will tell you more about this activity.
3. PARTICIPATE in an experiment on the effect of temperature on the activity of fish. ANSWER questions on the results of the experiment. Your teacher will tell you more about this activity.
4. ARRANGE with your teacher to complete this task by going through the CHECK-OUT ACTIVITY.

CHECK-OUT ACTIVITY

You will be provided a Fish Observation Chart. Investigate the behavior of one of the species of fish in your classroom aquariam for five days. Complete your Fish Observation Chart each day.

VOCABULARY

Aquarium - a pond, bowl, or glass tank in which living fish, water animals, and water plants are kept.

Aquatic - growing or living in water.

School - a group of fish swimming together.

Species - a group of plants or animals that have the same kinds of characteristics.

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INSTRUCTOR'S FINAL CHECKLIST

INVESTIGATING FISH BEHAVIOR

Accomplished	Not Accomplished

Performance Level: All items must receive a rating of ACCOMPLISHED. If any items are rated NOT ACCOMPLISHED, the student and the instructor will decide if any learning activities must be repeated.

In investigating fish behavior, the student:

1. Investigated the behavior of the fish for five days ..... [ ] [ ]
2. Completed all sections of the Fish Observation Chart ..... [ ] [ ]